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**(54) Striped toothpaste**

(57) A multi-phase toothpaste consists of an opaque white paste matrix containing a dental abrasive, and a plurality (e.g. four) transparent gel stripes embedded in and discrete from the matrix. Two of the gel stripes may be of one colour and two of another colour.

The toothpaste provides good cleaning and polishing properties, coupled with high visual attractiveness.

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## SPECIFICATION

## Toothpaste

5 This invention relates to a toothpaste in the form of two or more separate phases, one of which is a transparent or translucent gel. 5

U.K. Patent Specification No. 1,271,944 discloses toothpastes of this general type, wherein the main body of the paste is a transparent or translucent gel, and the secondary body contains cleaning and polishing agents.

10 We have now found that excellent cleaning and polishing properties, together with high visual attractiveness, can be obtained with a toothpaste of the above general type in which the main body is an opaque material containing a cleaning or polishing agent, and the secondary body is a transparent or translucent gel. 10

According to the present invention there is provided a multi-phase toothpaste, comprising a paste matrix and a plurality of secondary paste bodies embedded in and discrete from the paste matrix, characterised in that the paste matrix is an opaque material containing a cleaning or polishing agent and each secondary body is a transparent or translucent gel. 15

Preferably the secondary bodies include at least two bodies of different colours. The colours may serve to distinguish between secondary bodies containing different active ingredients, and also to provide visual distinctiveness. For example, one of the secondary bodies may contain an anti-stain or mouth freshening ingredient, while another secondary body, of different colour from the first, may contain an anti-plaque agent. The w/w ratio of paste matrix to secondary bodies may vary within wide limits, but preferably from 60 to 80% of the toothpaste consists of secondary material. The composition of the paste matrix and secondary material should be such as to minimise diffusion or other undesirable interaction between the matrix and material. To this end, it is preferred to match the pH values of the different phases as closely as possible. It has also been found that enhanced stability can be achieved if the rheological properties of the phases are substantially equal. 20 25

The secondary gel bodies may be completely contained within the paste matrix to provide cores surrounded by the matrix or they may be in the form of gel stripes only partly contained within the matrix so that a portion of the surface of the stripes is exposed at the surface of the toothpaste. 30

Substances which are normally incompatible with the secondary bodies, e.g. substances that would adversely affect or destroy the light transmitting properties of the secondary bodies, may be included in the paste matrix as a major component without significantly affecting these properties. For example, dentally acceptable abrasives, such as chalk, dicalcium phosphate dihydrate, calcium pyrophosphate, alumina, PVC powder and polymethylmethacrylate, as well as other substances which are incompatible with the secondary bodies, may be included in the paste matrix without affecting the stability of the secondary bodies. 35

In a preferred embodiment of the invention, the toothpaste has a paste matrix of an opaque white colour and two or more gel stripes extending longitudinally along the outside of the matrix. The gel stripes may all be of the same colour, or they may be of different colours. 40

In a particularly preferred embodiment, there are four gel stripes spaced equidistantly around the toothpaste, and suitably two diametrically opposed stripes are of one colour and two are of a different colour.

As used herein, "colour" means any visually perceivable colour, such as white, black, red, etc., or the absence of colour, i.e. "water-white" (totally clear and transparent). 45

The secondary bodies in the toothpaste of the present invention are preferably aqueous gels thickened with natural or synthetic thickeners, such as a natural or synthetic gum, carageenates, alginates, cellulose ethers and esters, carboxyvinyl polymers and the like. Where the gels are aqueous, it is desirable to include a humectant, such as glycerin, sorbitol, propylene glycol or a polyethylene glycol. Active ingredients may be included in the matrix or secondary bodies or both. 50

In accordance with conventional practice, the toothpaste of the invention may include materials such as detergents, sweeteners, flavouring agents, anti-caries agents and dentally acceptable abrasive material. For example, the toothpaste of the invention may comprise 15 to 75% dentally acceptable abrasive, 10 to 80% humectant, 0.25 to 5% detergent, and 0 to 2% sweeteners and flavouring agents, together with water and thickening agents to form the gel or gels. Colouring agents will be included to provide the desired colours. Other agents that may be included in the toothpaste are therapeutic agents for plaque or calculus reduction. Examples of such agents are disclosed in the U.S. Patent No. 4,022,880. 55

The multi-phase toothpaste of the invention may be readily prepared by feeding the several phases through separate tubes of a bundle of tubes. Where the secondary bodies are stripes, the matrix phase is fed through a central tube and the secondary phases through tubes arranged around the central tube. The bundle of tubes is inserted into a toothpaste container and gradually moved upwardly relative to the container as the container is filled. 60

The filling device will generally have a casing enclosing the bundle of tubes, and a main outlet orifice via the central tube, and to this end the central tube is connected to a dispensing device, usually a pumping device, for feeding the matrix material to and through the central tube. The secondary bodies are dispensed 65

in a similar fashion through one or more secondary tubes parallel to and surrounding the central tube.

Suitable apparatus for dispensing a multi-phase toothpaste in this manner is described in U.K. Patent Specification No. 962,757. The apparatus of Specification No. 962,757 may be modified so that each secondary tube may be connected to a separate source of gel material. This arrangement will then permit the dispensing of two or more secondary bodies of different composition and/or colour.

The following Examples illustrate the invention. All parts and proportions are by weight unless otherwise stated.

#### Example 1

A toothpaste having a white paste matrix and stripes of either blue or red transparent gel may be prepared from the following ingredients:

(a) Gel Phases		% w/w	
		Blue Gel	Red Gel
15	70% Sorbiton solution	50.00	52.00
	Precipitated silica	10.00	12.00
	Polyethylene Glycol	3.00	4.00
	Sodium Carboxymethyl Cellulose	1.30	1.30
20	Sodium Lauryl Sulphate	1.00	1.00
	Spearmint Essence	0.40	0.50
	Saccharin	0.15	0.15
	Calcium Glycerophosphate	0.13	0.13
	Sodium Monofluorophosphate	0.76	0.76
25	Blue dye	qs	—
	Yellow dye	qs	—
	Red Dye	—	qs
	Water	to 100.00	100.00
30	(a) White Paste Matrix	% w/w	
	70% Sorbiton solution	20.00	
	Polyethylene Glycol	3.00	
35	Precipitated silica	10.00	
	Sodium Carboxymethyl Cellulose	1.30	
	Sodium Lauryl Sulphate	1.00	
	Spearmint Essence	1.10	
	Saccharin	0.27	
40	Calcium Glycerophosphate	0.13	
	Sodium Monofluorophosphate	0.76	
	Titanium Dioxide	1.15	
	Calcium Carbonate	25.00	
45	Water	to 100.00	

The blue or red gel, and white paste matrix, are each separately prepared from the above ingredients, and are charged into an open toothpaste tube, the paste matrix being dispensed from a central tube and either the red or blue gel being dispensed from tubes spaced circumferentially around the central tube, according to the method and apparatus described in U. K. Patent Specification No. 962,757.

#### Example 2

A toothpaste having a white paste matrix and four gel stripes is prepared in a manner similar to that of Example 1, except that the red gel is dispensed from two tubes located diametrically opposite to the central tube, and the blue gel is dispensed from two other tubes located diametrically opposite the central tube. A toothpaste having a white paste matrix and alternating red and blue stripes is obtained.

#### CLAIMS

1. A multi-phase toothpaste, comprising a paste matrix and a plurality of secondary paste bodies embedded in and discrete from the paste matrix, characterised in that the paste matrix is an opaque material containing a cleaning or polishing agent and each secondary body is a transparent or translucent gel.
2. A toothpaste according to claim 1, in which the secondary bodies are completely contained within the paste matrix to provide cores surrounded by the matrix, or are in the form of gel stripes partly contained within the matrix so that a portion of the surface of the stripes is exposed at the surface of the toothpaste.

3. A toothpaste according to claim 1 or claim 2, in which the secondary bodies include at least two bodies of different colours.
4. A toothpaste according to any one of claims 1 to 3, comprising from 60 to 80-, by weight of the toothpaste, of paste matrix, and from 40 to 20-, by weight of the toothpaste, of secondary bodies.
- 5 5. A toothpaste according to any one of claims 1 to 4, in which the paste matrix comprises an opaque white paste and two or more gel stripes extend longitudinally along the outside of the matrix. 5
6. A toothpaste according to claim 5, in which four gel stripes are spaced equidistantly around the paste matrix, two diametrically opposed stripes being of one colour and two being of a different colour.
- 10 7. A collapsible tube, or other container, containing a toothpaste according to any one of claims 1 to 6, the paste matrix and secondary bodies being so arranged within the tube or container that when the tube or container is collapsed the secondary bodies will be discharged as stripes or cores within the paste matrix. 10
8. A method of making a toothpaste according to claim 1, in which the paste matrix is fed through a central tube and the secondary bodies are fed through tubes arranged around the central tube so as to apply the secondary bodies to the paste matrix as the paste matrix leaves the outlet orifice of the central tube.